# *Lung Function, Respiratory Symptoms and Quality of Life for Asthmatic Children in Public Housing in Boston*, MA

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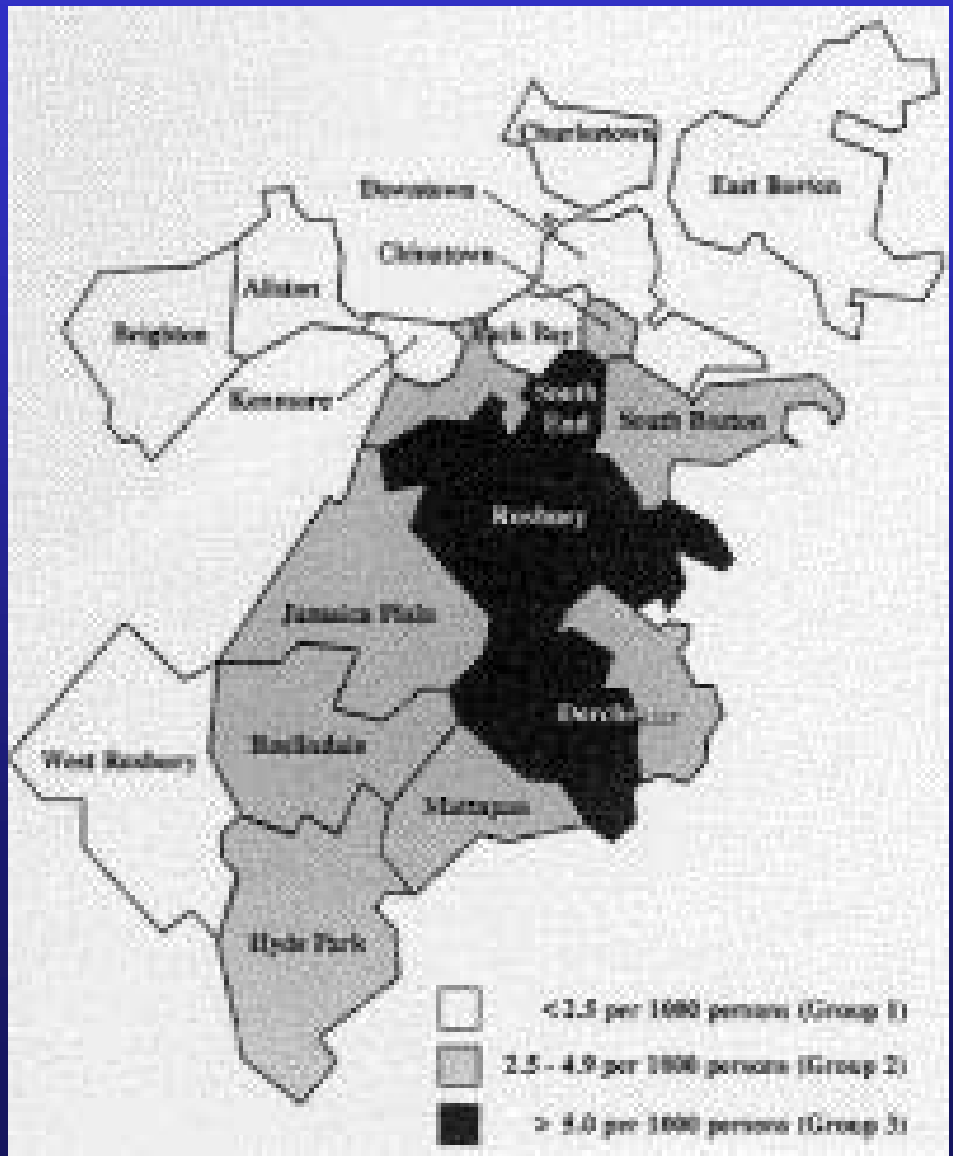
# Overview of talk

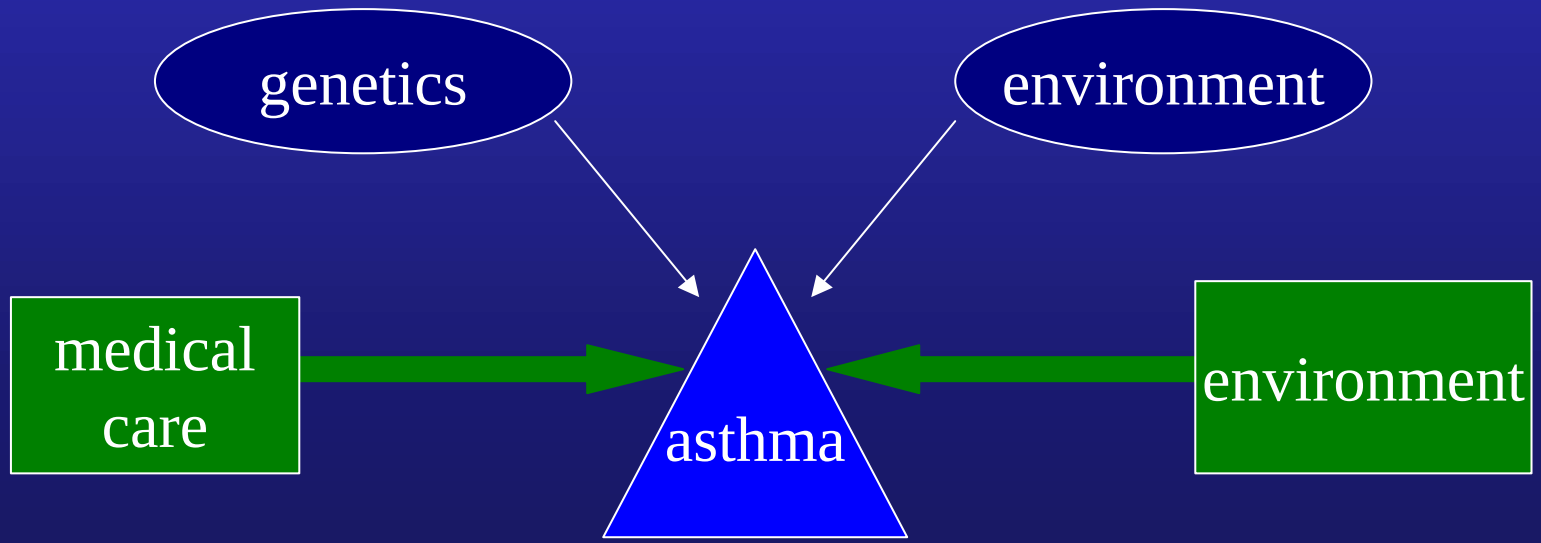
- Motivation and framework
- Background about Healthy Public Housing Initiative
- Baseline characteristics of asthmatic children and their caregivers
- Further research needs

# Age- and gender-adjusted asthma hospitalization rates in Boston, 1992




Gottlieb et al., 1995

# Key question: What factors could explain asthma trends and disparities?



# Categories of environmental risk factors

- Biological
  - Bacteria/viruses
  - Cockroaches
  - Dust mites
  - Mold
  - Pets
  - Pollen
  - Rodents
- Chemical
  - Tobacco smoke
  - Building materials
  - Carpet/furniture
  - Combustion products
  - Household chemicals
  - Pesticides
- Social
  - Stress
  - Exposure to violence
- Structural
  - Water/moisture
  - Heating,ventilation and air conditioning
  - Deteriorated buildings
  - Appliance disrepair
  - Old carpet and upholstery

# Why study public housing?

- Documented high asthma prevalence and potentially elevated risk factors across multiple domains
- More importantly, opportunity to intervene in physical/social environment
  - Interventions can be conducted on a broad scale, given high asthma/risk factor prevalence and single landlord

# HPHI partnership

Boston Housing Authority
Boston Public Health Commission
Boston University School of Public Health
Committee for Boston Public Housing, Inc.
Franklin Hill Tenant Task Force, Inc.
Harvard University School of Public Health
Peregrine Energy Group
Public Health Initiative, South Boston Community Health Center
Tufts University School of Medicine
Urban Habitat Initiatives
West Broadway Tenant Task Force, Inc.

# General HPHI goals

- Improve home environments to improve health and increase quality of life for residents of public housing in Boston
- Build capacity within city agencies, community organizations, and resident groups to sustain effort
- Impact national policy on housing design and health care financing for asthma

# Baseline evaluation

- Health/risk factor assessment prior to “pre-intervention” tracking
- Consideration of numerous health endpoints relevant for different phases of analysis
  - Lung function
  - Respiratory symptoms
  - Health care utilization
  - Self-reported (asthma-related) quality of life

# Key questions

- What is the prevalence of asthma risk factors in children enrolled in our intervention study, and how does this compare with other cohorts (e.g., NCICAS, US average)?
- How do the health endpoints relate to one another and to hypothesized asthma risk factors?

# Methods

- Asthmatic children age 4-17 recruited for intervention study from Franklin Hill, West Broadway, Washington Beech
- Recruitment coordinated by CHAs/community partners
- Enrollment occurred on rolling basis from 4/02 – 1/03 (two intervention phases)

# Methods

- Contents of baseline (intake) survey:
  - Family demographics
  - Access to health care
  - Child/family asthma history
  - Exposure to smoking
  - Medication adherence/usage
    - Taken from NCICAS

# Methods

- Information to evaluate social stressors/risk factors evaluated in intake:
  - Social cohesion
  - Exposure to violence
  - Perceived stress
- Juniper asthma QoL questionnaire for caregiver, child
- EuroQoL EQ5D for general QoL for child (5-question scale, visual scale)

# Methods

- Pulmonary function measured with portable spirometer
  - Compared with NHANES reference values
  - Height/weight used to calculate BMI
  - Only used in analysis for age 6 and older

# Methods

- Allergy testing
  - Skin testing w/prick puncture method (parallel to NCICAS)
  - 11-tree mix, 7-grass mix, dog, cat, mouse, cockroach, dust mite (European/North American), mold (*Alternaria, Aspergillus fumigatus, Cladosporium, Penicillium*)

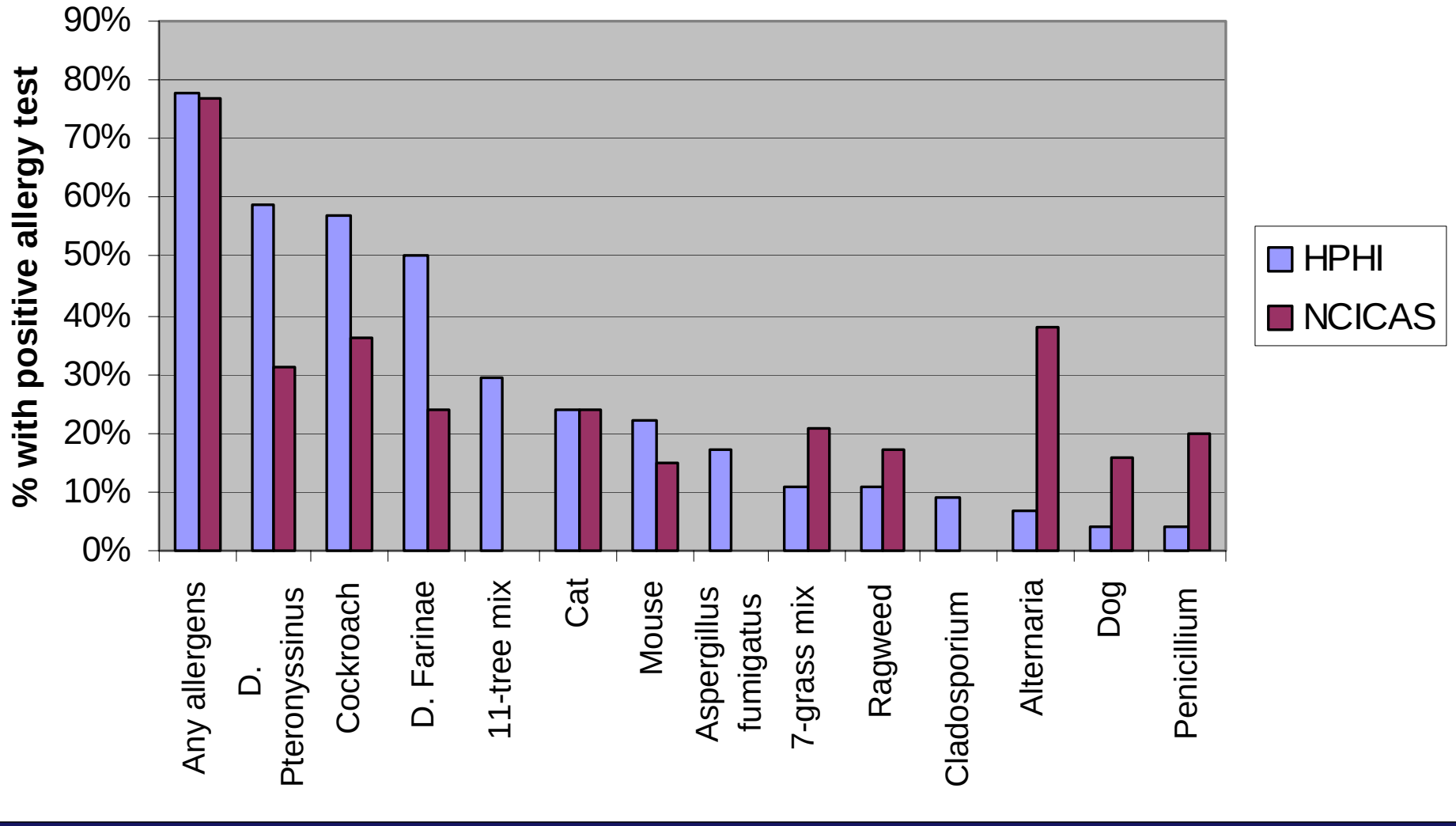
# Demographics

| | Franklin Hill | West Broadway | Washington Beech | Total |
|---|---|---|---|---|
| Number of children | 41 | 27 | 10 | 78 |
| Age (%) | | | | |
| < 6 | 27% | 30% | 40% | 29% |
| 6-9 | 32% | 26% | 20% | 28% |
| 10-12 | 22% | 30% | 20% | 24% |
| >= 13 | 20% | 15% | 20% | 18% |
| Race/Ethnicity (%) | | | | |
| Hispanic | 61% | 67% | 70% | 64% |
| African-American | 41% | 22% | 30% | 33% |
| Caucasian | 0% | 11% | 0% | 4% |

# Non-environmental risk factors

| | HPHI | NCICAS | US average |
|---|---|---|---|
| % in NICU at birth | 16% | 25% | 12% |
| % w/asthma family history | 70% | 57% | - |
| % with eczema/hay fever | 43% | - | 9% |
| % overweight ( > 95$^{th}$ pct BMI) | 56% | 19% | 15% |
| % of families with at least one smoker | 39% | 59% | 43% |

# Allergy testing results (n = 46)



# Adequacy of medical care

| | Franklin Hill | West Broadway | Washington Beech | Total | p-value (Wilcoxon rank-sum test) |
|---|---|---|---|---|---|
| % with doctor to call other than ER | 68% (N = 41) | 89% (N = 27) | 29% (N = 7) | 72% (N = 75) | 0.005 |
| % with written asthma action plan | 39% (N = 41) | 46% (N = 24) | 10% (N = 10) | 37% (N = 75) | 0.14 |
| % with peak flow meter | 28% (N = 40) | 33% (N = 27) | 10% (N = 10) | 27% (N = 77) | 0.37 |
| % of persistent asthmatics using long-term control medication | 21% (N = 19) | 57% (N = 21) | 14% (N = 7) | 36% (N = 47) | 0.03 |

# Exposure to violence

| | Franklin Hill | West Broadway | Washington Beech | Total | p-value (Wilcoxon rank-sum test) |
|---|---|---|---|---|---|
| % afraid of violence in nbd | 63% (N = 30) | 20% (N = 20) | 43% (N = 7) | 46% (N = 57) | 0.01 |
| % directly impacted by violence in nbd | 41% (N = 32) | 14% (N = 22) | 0% (N = 7) | 26% (N = 59) | 0.02 |
| % not let children play outside due to violence in nbd | 60% (N = 30) | 23% (N = 20) | 14% (N = 7) | 41% (N = 59) | 0.009 |

# Asthma severity/symptoms (in two weeks prior to enrollment)

| | Never | 1-2 times/week | 3-6 times/week | At least daily |
|---|---|---|---|---|
| Wheezing, tightness in the chest, or cough (N = 74) | 20% | 41% | 24% | 15% |
| Slow down/stop play or activities (N = 74) | 34% | 35% | 19% | 12% |
| | Never | 1-2 times | 3-4 times | At least 5 times |
| Wake up at night (N = 76) | 32% | 34% | 25% | 9% |

# Correlations among health outcomes

| | Symptom score | EQ5D | VAS | Child AQL | Caregiver AQL | FEV1% |
|---|---|---|---|---|---|---|
| EQ5D | -0.07 | - | - | - | - | - |
| VAS | -0.29 * | 0.20 | - | - | - | - |
| Child AQL | -0.43 ** | 0.44 ** | 0.43 ** | - | - | - |
| Caregiver AQL | -0.46 ** | 0.27 * | 0.28 * | 0.49 ** | - | - |
| FEV1% | -0.12 | 0.14 | -0.24 | -0.08 | -0.07 | - |
| PEF% | -0.03 | 0.05 | -0.24 | -0.09 | 0.08 | 0.65 ** |

*: $p < 0.05$, **: $p < 0.01$

# Conclusions from regressions

- No significant predictors of FEV1%
- Respiratory symptoms moderately related to household size ($p = 0.02$), presence of smokers ($p = 0.08$)
- Child asthma QoL strongly related to respiratory symptom severity ($p = 0.0002$)
- Caregiver asthma QoL strongly related to child symptom severity ($p < 0.0001$), caregiver perceived stress ($p = 0.0002$)
  - Note: Demographic variables, allergy status, other factors not significant

# Limitations of models

- Convenience sample w/small sample size
- Questions of generalizability
- Cross-sectional comparison
- Difficulty in interpreting meaning of regression covariates (correlation vs. causation)

# Research action needed

- Better understanding of cause for inadequate medication usage
- More detailed multifactorial exposure assessments (i.e., traffic, allergens, and stress)
- More research on efficacy of individual interventions, bundles of interventions in reducing asthma morbidity